HONOLULU
LA JOLLA
MONTEREY
TIBURON

SOUTHWEST FISHERIES CENTER

MONTHLY REPORT - APRIL 1981

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STATUS OF PUBLICATIONS

Published

Hohn, Aleta A. 1980. Age determination and age related factors in the teeth of western North Atlantic bottlenose dolphins. Sci. Rep. Whales Res. Inst. 32:39-66.

Teeth were taken from 120 bottlenose dolphins, Tursiops truncatus, which had stranded on the mid-Atlantic coast of the United States. The number of annual growth layer groups (GLGs) for each animal was used to construct a growth curve. The growth rate of coastal North Atlantic Ocean Tursiops is similar to other cetaceans in having a high initial rate of growth, with no differences in growth between females and males. In females, the first dentinal GLG is thickest and is followed by GLGs which become progressively narrower. In males, the second GLG is thicker than the first; GLGs beyond number two become progressively smaller but at a slower rate than in females. In males and females, the translucent layer makes up proportionally larger parts of the GLG as the animal ages, but in males the percent translucent layer remains constant at about 50% while in females it continues to increase up to about 70% of the GLG. These two factors, GLGs width and translucent layer width, indicate that the sex and age of the animal influence the deposition of GLGs. Incremental layers are also present, averaging 12 per GLG, and seem similar to incremental layers described in other marine mammals. A plot of the relationship of percent growth of the last GLG to time of death suggests that the deposition of GLGs is relatively constant, at least during the first half of the year, and that North Atlantic Ocean Tursiops give birth in the fall as well as in the spring.

THIS REPORT DOES NOT CONSTITUTE PUBLICATION AND IS FOR INFORMATION ONLY.

Laurs, R. Michael, Ronald J. Lynn, Robert Nishimoto, and Ronald Dotson. 1981. Albacore trolling and longline exploration in eastern North Pacific waters during mid-winter 1981. NOAA Technical Memorandum, NOAA-TM-NMFS-SWFC-10, March 1981, 40 pp. + 52 p. Appendix.

Three chartered commercial fishing vessels using modified halibut long-lining gear conducted an exploratory albacore longlining operation 700 to 900 nm west of San Diego during January-February 1981. The objective of the cooperative investigation was to evaluate the potential for establishing a U.S. fishery in eastern North Pacific waters. An area several hundred miles off the coast of southern California and extending nearly to the Hawaiian Islands was selected for the study. The U.S. albacore fishery does not operate in the winter, and in the selected area, limited exploratory troll fishing has taken place only during other seasons of the year.

Each vessel fished approximately 300 hooks per longline set in and about the thermocline at depths of 300 to 450 feet. Extrapolating the catches made during the survey indicate that albacore production may average 3000 pounds per set using a longline with 1500 to 2000 hooks.

If these catches for this very modet effort prove to be representative of the season and region, then there is a strong potential for expansion of the United States albacore fishery.

Shomura, Richard. 1980. New laws make waves. In Karen Knudsen (editor), One third of the world, p. 19-21. Third annual issue. Pac. Asian Aff. Counc., Honolulu.

Approved by Center Director

Jennings, Jacqueline G., James M. Coe and Walter F. Gandy. A corral system for examining pelagic dolphin schools. For consideration for publication in Marine Fisheries Review.

Kato, Susumu. Resources and market potential explored for shortbelly rockfish. For consideration for publication in Pacific Fishing Magazine.

Marten, Gerald G., and Jeffrey J. Polovina. A comparative study of fish yields from various tropical ecosystems. For consideration for publication in International Center for Living Aquatic Resources Management/Commonwealth Scientific and Industrial Research Organization Workshop on the Theory and Management of Tropical Multispecies Stocks, Cronulla, Australia, January 1981.

Stevens, E. Don, and Andrew E. Dizon. Energetics of locomotion in warm-bodied fish. For publication in Annual Review of Physiology [book].

Technical Memorandum

Squire, James L., Jr. 1981. Observations of albacore (Thunnus alalunga) fishing off California in relation to sea surface temperature isotherms as measured by an airborne infrared radiometer. NOAA Technical Memorandum NMFS, NOAA-TM-NMFS-SWFC-11.

Sund, Paul N. 1981. Tunas, oceanography and meteorology of the Pacific, an annotated bibliography, 1950-78, NOAA Tech. Rep., NMFS SSRF-744, 123 pp.

Administrative Reports

La Jolla Laboratory

Coe, J. M., and P. J. Vergne. 1981. La modificacion de una red utunera de cerco obtinene el record de Baja mortalidad de delfines. [Modified tuna purse seine net achieves record low porpoise kill rate.] SWFC Admin. Rep. LJ-81-08.

HONOLULU LABORATORY

INSULAR RESOURCES INVESTIGATION

Algorithm for the Tropical Biomass Ecosystem Model Completed

Dr. Jeffrey J. Polovina, Statistician, assisted by Computer Technician Edward Webman, completed the mathematical algorithm for the Tropical Biomass Ecosystem Model to investigate the Northwestern Hawaiian Islands (NWHI) ecosystem.

The model is a biomass budget model which partitions the ecosystem into species groups and requires species group estimates of growth rates, diet composition, and food consumption. The model first estimates the species group biomasses and mortalities in the absence of fishing mortality, then simulates the short-term and long-term impacts of user-specified fishing strategies on the
ecosystem.
Polovina will now collaborate with researchers in the NWHI investigation to apply this model to the ecosystem at French Frigate Shoals.

Cruise to Northwestern Hawaiian Islands Completed

Richard N. Uchida, Leader of the Insular Ecosystem Study Task, reported that the NOAA ship Townsend Cromwell returned to Honolulu on April 23 after completing cruise 81-02 to the NWHI. The scientific field party on the cruise included Fishery Biologist Heeny S. H. Yuen (Chief Scientist, March 18 to April 4), Research Assistants Paul M. Shiota (Chief Scientist, April 4 to 23), William B. Barnett, Victor A. Honda, and Darryl T. Tagami.

The objectives of the 37-day cruise were to conduct (1) trawling operations with shrimp and Noreastern trawls for penaeid shrimps, armorheads, and alfonsins, (2) trapping operations for spiny and slipper lobsters, caridean shrimps, and fishes, (3) fishing with trolling lines and deep-sea handline gurdies and mackerel handlines for small tunas and tunalike fishes, fishes of the snapper-grouper complex, bigeye scad, and mackerel scad, and (4) netting operations with hoop nets for kona crab. Other missions included censusing monk seals and collecting scat samples at selected islands in the NWHI.

Kahala-Ciguatoxin Sampling Project in Final Stages

Research Assistant Bernard M. Ito sampled a total of 192 kahala for ciguatoxin at the fish auction market in April. Of the total, 15% were rejected in the radioimmunoassay for positive to borderline levels of ciguatoxin. According to Ito, this rejection rate is nearly twice as high as

that in April 1980. This brings the cumulative total of kahala sampled to 5,509 fish. The overall rejection rate is 15%. The kahala-ciguatoxin sampling project at the fish auction market will be phased out at the close of April.

Skipjack Tuna Swimming Speed and Respiration Rate Data Summarized

In collaboration with Dr. Daniel Weihs of the Technion Institute of Technology, Israel, Fishery Biologist Reginald M. Gooding summarized data on the absolute swimming speeds and respiration rates of skipjack tuna in shoreside tanks. In a paper which will be published in the Fishery Bulletin, Weihs hypothesizes that centrifugal forces significantly influence energy expenditure and swimming speed of fishes swimming in a curved path, e.g., tunas in tanks. The correction factors computed by Weihs to account for the effect of centrifugal force will be applied to the data summarized by Gooding.

Paper on Ongoing Northwestern Hawaiian Islands Projects Drafted

In response to a request from Director Barrett's Office, Task Leader Richard Uchida completed a draft discussion paper on the NWHI investigation which provides details on (1) the status of the Honolulu Laboratory's ongoing NWHI research projects, (2) research needs addressed by the spiny lobster fishery management plan and the seamount-groundfish preliminary management plan, (3) research needs that have to be addressed by the Honolulu Laboratory under the provisions of the Tripartite Agreement, and (4) areas which require future research.

Uchida also completed the final cruise instructions for TC-81-03 (Parts I and II), the preliminary cruise instructions for TC-81-04, and participated in a planning session for cruises in waters around Guam and the Northern Mariana Islands in 1982.

* * * * * * * * * *

James H. Uchiyama, Fishery Biologist, and Richard Tagami, Assistant, began preparation of a manuscript on length-weight relationships of fishes in the snapper-grouper complex from the NWHI. Ichiyama and Dr. Polovina held discussions with Robert Nishimoto, Fishery Biologist, SWFC, La Jolla Laboratory, and Dr. Anders Sweetland of the Hawaii Division of Fish and Game (HDFG), on the exchange of length-weight data and on line-fitting procedures for length-weight relationships.

FISHERY MANAGEMENT PROGRAM

Updated Assessment of Economic Characteristics of Northwestern Hawaiian Islands Lobster Fishery Completed

Dr. Michael F. Adams, Industry Economist, assisted by Research Assistant James C. Cooper, has provided the Western Pacific Regional Fishery Management Council (WPRFMC) with an updated assessment of the economic characteristics of the NWHI lobster fishery. The current draft of the Fishery Management Plan for the Spiny Lobster Fisheries of the Western Pacific Region does not incorporate important changes in the fishery which have occurred over the last year. The updated assessment provided by Adams and Cooper shows the fishery to be characterized by extreme ease of entry and exit of firms since commercial exploitation was initiated during 1976. Notwithstanding the entry of four new vessels and anticipation of increased landings (virtually all to be frozen lobster tails) during 1981, sustained investment in the fishery at existing levels remains tentative. The accompanying table illustrates the instability of the fishery over the last 6 years with respect to participation.

Annual entry and exit of fishery vessels for the Northwestern Hawaiian Islands lobster fishery, 1976 to 1981[1].

	Year					
Vessel	1976	1977	1978	1979	1980	1981
A	- - - - -	———	- - - - -	———	———	———
B	- - - - -	———	- - - - -	*	*	*
C		———				
D		- - - - - -				
E		- - - - - -				
F				———	*	
G					———	
H					———	———
I[2]						———
J[2]						———
K[2]						———
L[2]						———

[1] ——— regular lobster fishing; - - - - - occasional lobster fishing; * participation only in Hawaiian fisheries other than lobster; and blank entries indicates no participation in Hawaiian fisheries.

[2] In Hawaii during April 1981 and prepared to fish throughout the season.

The current six vessels employ about 48 workers directly. The fleet carries about 60% more traps and has about 90% more onboard freezer capacity than the 1980 fleet. However, the economic commitment to the fishery can be misleading, and has been in previous years, due to the versatility of the multigear fishing vessels. Changing conditions of increased expected profits in the U.S. west coast fisheries (Alaska included), for example, has resulted in the immediate exit of firms from the NWHI fishery. On the other hand, the perception of temporary excess profits (windfall profits) available in the NWHI lobster fishery can generate quick short-term investment.

Hawaii Skipjack Tuna Landings Continue Below Long-Term Average

The April 1981 Hawaii landings of skipjack tuna were estimated at 128.7 metric tons (MT), which is 85.1 MT above the April 1980 landings and 39.1 MT below the 1964-80 long-term average for April. The cumulative landings from January through April were estimated at 240.7 MT, which is 104.9 MT above the 1980 landings for the same period and 238.8 MT below the 1964-80 long-term average for the same period.

PELAGIC RESOURCES INVESTIGATION

Automated Feeders Developed for Magnetic Discrimination Experiments

NOAA Corps Officer Lt. Howard A. Jemison and Dr. Andrew E. Dizon, Leader of the Pelagic Ecosystem Study Task, recently completed construction of two remotely-controlled fish feeders for an automated experimental system which is designed to train tunas to discriminate magnetic field cues. The feeders are an innovation because no commercially-available feeders are designed to accommodate cut pieces of raw fish. A microcomputer controls operation of the feeders and the rest of the experiment. The Kewalo Research Facility now has three magnetic testing tank systems, two manually-operated and one computer-operated. A report detailing the feeders is being prepared for publication in "Behavioral Research Methods and Instrumentation."

Magnetic Field Discrimination Testing Continues

Four yellowfin tuna have now been successfully trained to discriminate between normal and altered magnetic fields at the Kewalo Research Facility. With the fourth fish, the intensity of the stimulus was reduced successively to one quarter the intensity at which the fish was trained. At the reduced field intensity, the maximum stimulus available to the fish was equivalent to shifting the fish from Hawaii to about lat. 50°N. The fish rapidly learned to make the discrimination at the lowered intensities. The ease with which the fish learned these discriminations is comparable to the learning by goldfish of visual discriminations under ideal psychological testing conditions.

Preparations Continue for Rearing of Skipjack Tuna Larvae

University of Hawaii (UH) graduate student Sharon D. Hendrix and Research Assistant Linda A. Barraclough have mass phytoplankton and zooplankton cultures ready for the anticipated rearing of skipjack tuna larvae this summer. Barraclough is summarizing phytoplankton mass culture records to determine the effect of temperature and temperature fluctuation on culture longevity. Hendrix is successfully maintaining cultures of the harpacticoid copepod Tigriopus sp. and has found that these copepods will grow and reproduce in 250-liter fiberglass cylinders. With a starting inoculum of 6,000 Tigriopus adults, harvests 2 weeks later result in about 200,000 Tigriopus adults and nauplii. Hendrix is continuing analysis of the stomach contents of planktonic skipjack tuna larvae. Copepods and Oikopleurans were found most frequently in the contents.

Thomas K. Kazama, Fishery Fishery Biologist, is modifying and fabricating the culture system to to increase production of the mass phytoplankton and zooplankton cultures. He is also involved in the planning phase of constructing a new culture laboratory in a recently acquired annex. Construction of the facility has already begun.

Skipjack Tuna Ova Samples Indicate Spawning Season Near

Research Assistant Martina K. K. Queenth reports that the skipjack tuna ova samples collected from the cannery by Research Assistant Henry Kishinami show steady growth. The samples at the beginning of the month averaged 0.538 mm diameter, whereas those at the end averaged 0.551 mm. Those sampled at the end of this month were not only larger but better developed.

Draft Manuscripts on Double Tagging Experiments Completed

Dr. Jerry A. Wetherall, Leader of the Stock Assessment Study Task, completed a manuscript entitled "Analysis of Double-Tagging Experiments," targeted for publication in the Fishery Bulletin. The paper provides a comprehensive review of present thinking and techniques for evaluating tag-shedding rates through double-tagging experiments. In addition, it presents several new estimation methods to accommodate exact-time recapture statistics, multi-release experiments, and other commonly encountered situations not adequately treated by existing procedures.

Dr. Wetherall also co-authored with Marian Y. Y. Yong, Mathematician, a companion manuscript entitled "Planning of Double-Tagging Experiments." This paper presents guidelines for deciding how many fish to double-tag, how to group recapture data, and how long to run a double-tagging experiment. Sample size tables and formulas are given for two estimation objectives: (1) estimating Type II shedding rates using the Bayliff-Mobrand regression model, and (2) estimating total instantaneous mortality rate by regression of double-tag recapture statistics on time out.

* * * * * * * * * * *

Tamio Otsu, Chief, Pelagic Resources Investigation, translated a report, "Selection curve of the hook of longline," by Koike et al. (J. Tokyo Univ., Fish. 55:77-82, September 1968), as requested by Stephen Ralston, University of Washington graduate student. A copy of the translation is available in the Honolulu Laboratory library.

LA JOLLA LABORATORY

Coastal Fisheries Resource Division

Larval Pollock Successfully Produced Under Laboratory Conditions

Dr. Reuben Lasker, Division Chief, reports that his joint project with University of Alaska scientists Dr. Howard Feder, A. J. Paul, and James Hendee to spawn pollock (Theragra chalcogramma) in captivity and to produce feeding larvae for experimentation was reasonably successful this month. One induced spawning was accomplished.

The larvae produced from the laboratory-spawned pollock were utilized in a study of nauplii concentrations necessary for successful prey capture by the larvae. The nauplii of a fast-growing cultured copepod, Tigropus californicus, of a size preferentially ingested by pollock larvae in nature, were utilized as prey in these observations. Preliminary analysis of the results of feeding studies suggest that the threshold concentration of prey is approximately 12 per liter. Estimates of nauplii concentration that are necessary for survival and growth will be initiated as soon as more pollock larvae are available. Threshold concentrations for feeding are important indicators of favorable and poor areas of the ocean for larval survival.

Several attempts to capture ripe pollock in Resurrection Bay and the adjacent Gulf have been made. To date, few ripe fish have been encountered and NMFS surveys have verified that pollock will spawn relatively late this year in the Gulf of Alaska.

LARVAL FISHES, COASTAL EAST PACIFIC

Filter Feeding Behavior of Adult Anchovy Analyzed

Dr. John Hunter, Leader of Larval Fishes, Coastal East Pacific Group, has completed the draft of a manuscript describing the threshold for filter feeding in the northern anchovy, Engraulis mordax. The results of this study will help in the interpretation of the ecological role and extent of egg cannibalism as a mechanism for population regulation.

Hunter found that when Artemia nauplii were offered to anchovy, the density threshold for the onset of filtering fell between 5 and 18 nauplii per liter when a significant difference between initial and final Artemia density was the criterion. The threshold density for the onset of filtering anchovy eggs was between 1 and 2 eggs per liter while that for Gymnodinium splendens was between 150 and 322 cells per liter.

It was noted that behavioral changes occurred at much lower densities than those at which changes in food concentration were detected. Significant changes in the percentage of fish observed filtering occurred at nearly all densities tested. The incidence of filtering behavior increased with food density but the intensity of the response differed among food types. For a given density, the percentage of fish filtering was highest for Engraulis eggs and intermediate for Artemia nauplii; only a small proportion of the fish filtered Gymnodimiun at densities as high as 322 cells per liter. When these data were combined by expressing initial food density in terms of dry weight per liter rather than numbers of particles per liter, the behavior observations, made on all three foods, fell along a common curve, indicating that the intensity of filtering by anchovy schools may be a function of the biomass of filterable foods in the water. The form of the relationship between incidence of filtering behavior and dry weight of food per liter resembles the Type II predator response curve of Holling (1965), that is, a negatively-accelerated rise to a plateau of feeding activity with an increase in food density.

The anchovy also displayed the tendency to retain a high level of filtering activity after being given a high initial food density, even after the prey density in the tank was reduced below that required for the onset of filtering behavior. Thus, anchovy encountering a dense patch of prey may reduce the density far below the threshold for initiation of feeding and consequently have a greater impact on prey populations than indicated by filter feeding thresholds.

Filter feeding is often believed to be non-selective. However, analysis of the behavioral observations in this study indicates that it is selective, at least in relation to the biomass of the prey. The filtering act itself may not be selective although a lower limit to prey size is established by fineness of the gill rakers. Selectivity is caused, however, by changes in the frequency and duration of filtering acts and movements that cause the school to remain within a patch of prey. According to the work of Dr. Colin Barnett, NRC Fellow at the SWFC, chemical stimuli alone are sufficient to elicit the first stages of the response of anchovy to a patch of filterable prey (i.e., change in school direction and swimming of individual fish in small elliptical orbits).

Methods to Calibrate Egg Production Model and Larval Census Method for Northern Anchovy Spawning Biomass Estimate Being Developed

Dr. Nancy Lo, Mathematician, is currently developing methods to calibrate estimates of northern anchovy, Engraulis mordax, spawning biomass, based on two methods: The egg production model (EPM) and the larval census methods (LCM). The former method was first applied to northern anchovy in 1980; the latter has been used for the past 20 years.

Three analyses are currently in progress with major effort being concentrated on analytical formulation and data file construction. The first analysis will develop egg-larva survival curve(s) based on age of eggs and

larvae collected in 1979, 1980, and 1981. The mortality estimates of these eggs and larvae will then serve as the basis for the next two analyses.

The second analysis will derive a generalized larva-biomass model which leads to different larva-biomass relationships, (e.g., linear or nonlinear), depending upon whether or not the mortality rate of eggs and larva are stock dependent. The final analysis will give an approximate EPM estimate for the period 1950-1978; the current EPM requires data on staged eggs which were not available until 1979 (the LCM is based on a linear relationship between larva and biomass).

After the completion of the latter two analyses, a calibration procedure can be subsequently developed to relate the egg production method of biomass estimation to the larval census method. The preliminary analysis on egg-larva mortality, based on 1979-1981 data, indicates an age-dependent mortality. Whether the egg-larva mortality is stock (or density) dependent will be determined after examination of the historical time series of egg-larva data.

Microplankton Samples Taken in Coastal Upwelling Sites

Post-upwelling evolution of plankton communities is to be addressed by Dr. Robert Owen, Oceanographer, and Dr. Angeles Alvariño, Fishery Biologist, from a data set generated by Coastal Fisheries Resources Division members on two cruises off California. Working off Pt. Conception in late March aboard the University of Southern California's R/V Velero, John Metzger and Dr. Reuben Lasker, Division Chief, obtained a set of vertical plankton tows, micro-zooplankton filtration, and whole-water phytoplankton samples, together with environmental data in and near active upwelling sites, which will provide definition of initial conditions. A similar set of observations was collected downstream aboard the NOAA research vessel, Jordan, in April by Fishery Biologist Carol Kimbrell, Physical Science Technician Lee Inness-Brown, and Biological Technician William Flerx.

Using NOAA-6 satellite thermal imagery supplied by Randee Recht, Remote Sensing Specialist, Owen was able to request via radio station WWD that specific microplankton samples be taken in a large plume of cooler water found in several thermal images extending from Pt. Conception well into the Southern California Bight. Owen and Recht are working to determine sources of the cool plume and movement of its fronts through the period of Jordan coverage (see following article).

Through the satellite images, Jordan measurements are to be related to Velero measurements to determine time/space changes in plankton from a community supportive of adult anchovy feeding to one supportive of larval anchovy.

ALBACORE FISHERIES PROGRAM

Satellite Remote Sensing Applications in Fishery Research

Satellite Images Used to Select Specialized Sampling Sites

This month Dr. Robert Owen, Oceanographer, used satellite imagery to select CalCOFI stations for specialized sampling during the R/V Jordan cruise 8104. Randee Recht, Remote Sensing Specialist, and Jose Pelaez, SIO graduate student, processed CZCS (Coastal Zone Color Scanner) and infrared images from the Nimbus-7 and NOAA-6 satellites, respectively. These images were viewed in order to discern CalCOFI stations which were located across the boundary of an intensified cold water plume; this plume extends southward from the Pt. Conception upwelling region. A graphic overlay of CalCOFI lines and stations, formulated by Recht, was utilized in the selection process. (More details of the cruise are given in the preceding article.)

Nimbus-7 Satellite Images Used in Fisheries Demonstration Project

Scientists at the La Jolla Laboratory are currently participating in a real-time Fisheries Demonstration project designed to produce charts, based upon blue/green ratios as a measure of chlorophyll concentration, which will aid salmon fishermen in locating favorable waters. Other organizations contributing to the project are the NASA-Jet Propulsion Laboratory, Visibility Laboratory at Scripps Institution of Oceanography, Scripps Remote Sensing Facility, and Ocean Data Systems Incorporated (ODSI).

Two trial runs were carried out this month in preparation for a real-time demonstration in May. Randee Recht, Remote Sensing Specialist at the La Jolla Laboratory, SWFC, archived and reformatted two Nimbus-7 satellite passes for pick-up by the Visibility Lab where processing and atmospheric corrections are applied. A contour map is then sent by telecopy to ODSI and transmitted via radio facsimile to the fishing vessels.

Dr. Reuben Lasker, Chief of the Coastal Fisheries Resources Division, La Jolla Laboratory, and Dr. R. Michael Laurs, Oceanographer, are assisting in the coordination of the project.

Results of Recent Albacore Research Findings Presented in Workshops for Fishermen

Dr. R. Michael Laurs, Leader of the Albacore Fisheries Program, presented talks to about 125 albacore fishermen at workshops in Oregon ports during the latter part of April. The workshops were sponsored by Oregon State University Sea Grant Marine Advisory Program. Laurs presented findings from recent acoustic tracking experiments designed to investigate the depth distribution

of albacore and albacore-temperature relationships; he also summarized the results of the albacore tagging project which indicate that there are at least two substocks of albacore that enter the U.S. fishery and that these substocks have different migration patterns. In addition, Laurs discussed results from the mid-winter albacore longline fishery exploration conducted cooperatively by the Southwest Fisheries Center and the American Fishermen's Research Foundation (AFRF). Funding for the study came from a Saltonstall-Kennedy grant to AFRF. The talks were well received by the fishermen and there was considerable discussion from the audience.

Laurs was also invited recently to give a talk on albacore to the San Diego Sportfishing Association. He addressed about 70 sportfishing boat operators from the greater San Diego area. The topics of his talk included information on albacore depth distribution and temperature relationships based on acoustic tracking experiments, migration patterns, and general albacore biology. This talk was also very well received, with much audience participation and discussion.

Paper Describes Albacore Fishery in Eastern North Pacific

A detailed report (issued as NOAA Technical Memorandum 10)[1] describing the results obtained by three chartered commercial fishing vessels using modified halibut longlining gear to catch albacore in the eastern North Pacific, has been published by four members of the Albacore Fishery Investigation: Dr. R. Michael Laurs, Oceanographer, Ron Lynn, Oceanographer, Robert Nishimoto, Fishery Biologist, and Ron Dotson, Biological Technician. The vessels described conducted an exploratory operation 700 to 900 n mi west of San Diego, California, during January-February 1981.

The objective of this investigation was to evaluate the potential for establishing a U.S. fishery on the southern substock of North Pacific albacore tuna during winter months in eastern North Pacific waters. An area several hundred miles off the coast of southern California and extending nearly to the Hawaiian Islands was selected for the study. The U.S. albacore fishery does not operate in the winter, and in the selected area limited exploratory troll fishing has taken place only during other seasons of the year. The purposes of the study were: 1) to conduct exploratory fishing using trolling and longline fishing methods to evaluate the feasibility of catching albacore, 2) to make scientific observations to determine oceanographic conditions that may influence albacore distribution and relative abundance in the area, 3) to collect data for albacore biology and fishery studies, and 4) to tag and release albacore for migration and stock structure studies.

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[1] A limited number of copies of NOAA Technical Memorandum No. 10 are available upon request from the Director, Southwest Fisheries Center, P.O. Box 271, La Jolla, California 92038. In addition, copies of this and other NOAA Technical Memoranda may be purchased from: U.S. Department of Commerce, National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22161.

Results from this study suggest that the U.S. albacore fishery can be expanded to operate during the winter months. Within a large area 700 to 900 miles west of San Diego, albacore were caught each day during exploratory longline fishing operations. Logistic considerations limited the westward extent of this study; it is believed, however, that good fishing success may also be expected farther to the west, probably to at least the longitude of the Hawaiian Islands.

It appears that albacore production may average approximately 3,000 pounds per set using a longline with 1,500 to 2,000 hooks. This production estimate is based on an extrapolation of fish catches made using about 300 hooks. Experience gained during the study indicates that a 3-man crew can handle a 1,500 to 2,000 hook longline and that 50 to 75 foot vessels, typical of the U.S. albacore fleet, can operate in the latitudes of the area under study during winter months. More exploratory effort is needed in trolling to arrive at conclusions regarding potential yields. However, the catches made as a result of the small effort expended during this study were encouraging. This study was carried out cooperatively between the National Marine Fisheries Service, Southwest Fisheries Center (SWFC), and the U.S. albacore fishing industry American Fishermen's Research Foundation (AFRF). Saltonstall-Kennedy funds awarded to the AFRF were used to charter fishing vessels and finance other costs to conduct the study. Laurs, Leader of the Albacore Fisheries Program, planned the work and worked with the AFRF to organize the overall study. The actual operational aspects of the study were carried on by the AFRF. In addition, the SWFC provided scientific equipment and three fishery scientists went aboard one of the chartered fishing vessels to make scientific observations and keep detailed records related to the fishing operations.

SURVEY SYSTEMS DEVELOPMENT AND EVALUATION

Visiting Peruvian Scientist Assists in Implementation of Egg Production Method

Fishery Biologist Dr. Paul Smith, Project Leader, reports that Dra. Haydee Santander, Ichthyoplankton Project Leader at Instituto del Mar del Peru (IMARPE), Callao, Peru, visited the Coastal Division to continue implementation of the newly developed "Egg Production Method" in order to obtain an absolute instantaneous spawning biomass estimate for the Peruvian anchoveta in August of this year. The first stage of this project involved a visit to the Coastal Division by Dr. Jurgen Alheit, Biologist for the ichthyoplankton section of the Peruvian-German Cooperative Program (PROCOPA), in April 1980. Santander and Alheit attended the CalCOFI Conference last October, accompanied Smith on a small segment of an "Egg Production Method" cruise to see the field techniques of the Coastal Division, and observed and performed laboratory work on staging anchovy eggs and deriving the age of each egg. In addition, Alheit boarded the contract trawler, Nelle Belle, to learn the adult sampling technique from Ron Dotson, Biological Technician, and Ken Mais, California Department of Fish and Game. Smith conducted a workshop at IMARPE during October-November 1980.

Planned steps to implement the Egg Production Method include the design, conduct, and analysis of a cruise on the new Peruvian ship, the R/V Alejandro de Humboldt, contributed by the German Government. The Humboldt was constructed in 1979 to assist fishery management research in Peru. It is designed as a medium German trawler and modifications are being made for biological, physical, and chemical oceanographic sampling. The cruise was planned by Santander, Alheit, and Smith to incorporate 120 midwater trawls and 929 vertical egg tows from 70 meters over a 540-mile segment of the Peruvian coast from Paita to Pisco and offshore 90 miles (Figure 1). The anchoveta gonads collected for the project will be processed by contract to Scripps Institution of Oceanography and the plankton samples will be processed at IMARPE. The data analysis will follow procedures and algorithms developed by various people in the Coastal Division. Smith will accompany the first segment of the cruise and later debark to convert the data processing programs to the PROCOPA (Program Cooperativo Peruvian Aleman) HP 1000 computer in late August and September.

Future Peruvian work will include development of the Egg Production Method for the sardine off Peru, Sardinops sagax. Upon completion, the joint estimation of sardine and anchoveta off Peru will have major benefits for a correct interpretation of the California larval census method for the Pacific sardine (Sardinops sagax caerulea) and the northern anchovy (Engraulis mordax). A paper by Smith, Alheit, and Santander is in preparation, comparing the sample probability distribution of E. mordax and E. ringens.

A paper entitled "Probabilidad de Distribucion de Huevos de Anchoveta (Engraulis ringens)" has been authored by Santander, Alheit, and Smith for publication by IMARPE. This paper is a statistical summary of 911 vertical Hensen net samples from which it is inferred that coefficients of variation in mean egg production estimates will be of the order of 20% from the first egg production cruise off Peru.

COMMERCIAL AND RECREATIONAL FISHERIES RESEARCH FOR MANAGEMENT

Minimum Size Limit for Anchovy Discussed at Meetings

During April the Anchovy Management Plan Team members at the Southwest Fisheries Center (Dr. Daniel Huppert, Supervisory Industry Economist, and Dr. Gary Stauffer, Fishery Biologist, La Jolla Laboratory, with Alec MacAll, California Department of Fish and Game) met with CF&G personnel and with the Pacific Fishery Management Council's Anchovy Advisory Subpanel. The main topic of discussion was the 5-inch minimum size limit: Its purpose, biological rationale, and recent problems regarding its implementation. The prime motivation for the current re-examination of the size limit was the confiscation of seven loads of undersized anchovies last spring and intermittent similar incidents since then. In response to the legalization, Larry Bozanich, Fishermen's Cooperative Association of San Pedro, requested that the PFMC review recent information regarding the need for a size limit.

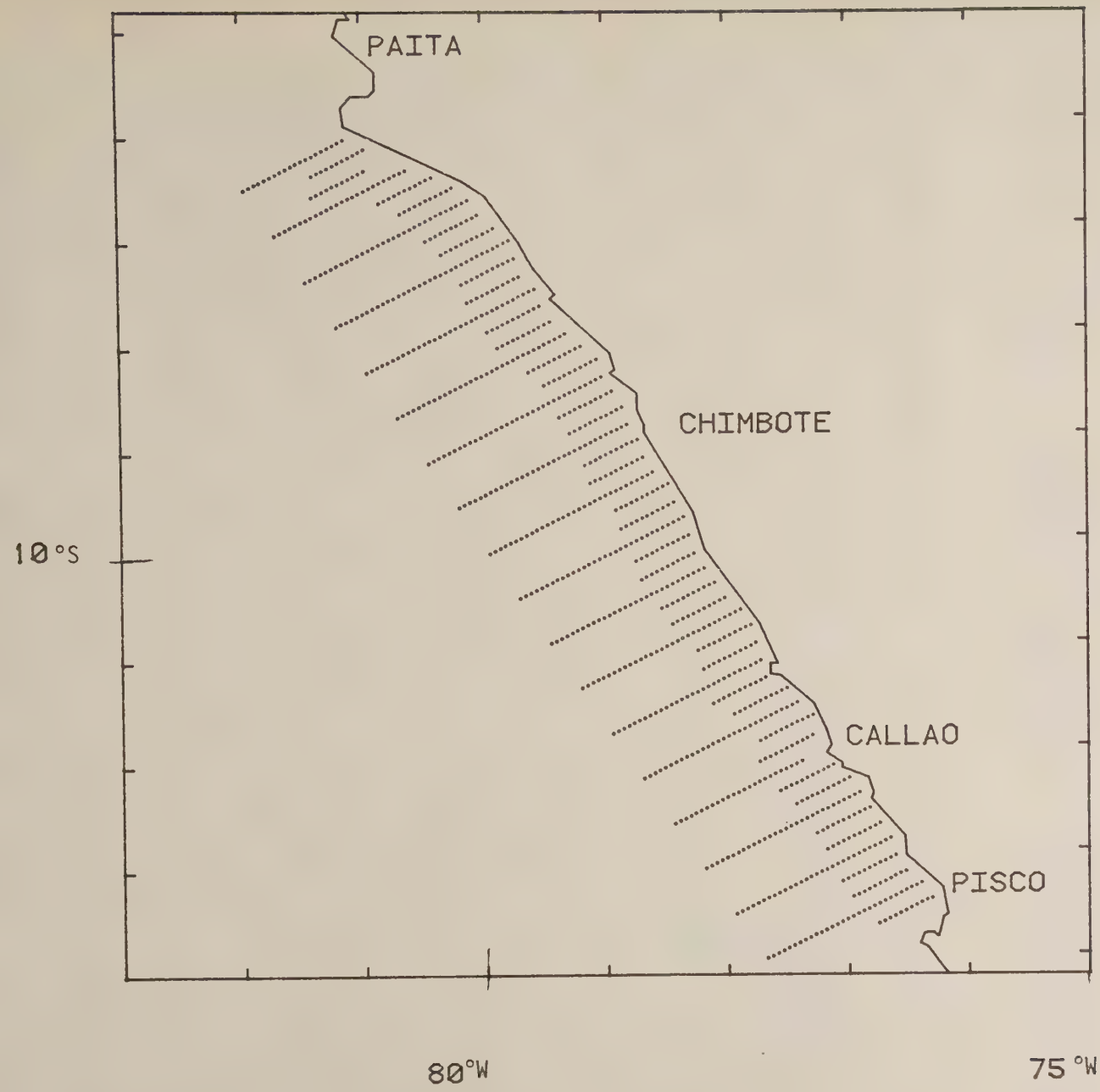

Figure 1. Cruise pattern and coast line of Peru drawn by Coastal Division computer graphics system. Programs for graphics are derived from those used by Smith, Haight and Charter for the California-Baja California coastline and cruise patterns.

Briefly, the rationale for a 5-inch size limit in the anchovy FMP was very sketchy, with the traditional "yield-per-recruit" approach providing no support. Some additional average sustainable yield may be available if the fishery avoids prespawners, but recent evidence (from SWFC midwater trawl surveys) shows that a high proportion of 4-5 inch fish are in spawning condition. In addition, CF&G market sample data summarized by R. Parrish, Pacific Environmental Group, indicates that growth of anchovies during their first two years seems to be highly variable. In some years the youngest cohort exceeds 5 inches in average length before 1 year of age and in other years the fish's growth seems to "stall" before reaching 5 inches. In the latter case, the commercial fishery cannot fish the 1-year olds without risk of exceeding the 15% allowance for undersized fish. From the fishermen's standpoint the problem is further aggravated by the difficulty of determining at sea whether the small fish contribute less than 15% of each load.

Several issues to be addressed are:

1) To what extent does the 5-inch limit serve as a desirable safety net preventing drastic overfishing if the quota is set too high?

2) Would the fishermen be subject to fewer seizures with little or no additional resource risk if the size limit were reduced slightly or the percent allowance for undersized fish increased?

3) Does the analysis, which indicated that a size limit could increase sustainable yields, need to be revised in light of recent evidence?

California Partyboat Fishing Data Analyzed

This month Economist Jane McMillan began work on a project with Dr. Daniel Huppert, Supervisory Industry Economist, to analyze data on recreational partyboat fishing in California. Several models are being examined in an attempt to arrive at values for recreational fishing. One method, a variant of the travel cost valuation method, attempts to place a value on the partyboat fishing experience by measuring the travel time or distance to the fishing site. Passengers are grouped into areas by their reported zip code. Using zip code maps, data were grouped into 97 zip code groups, each with approximately 40 observations. Population data for each zip code group was added to the data file and preliminary regression and correlation matrices were run on the entire data set. A subset of the data was also examined for the summer, surface, salmon fishing trips taken in San Francisco Bay. Computer Specialist Susan Iacometti helped McMillan to modify and upgrade the PARTYBOAT data base and to create subsets delineated by zip code.

Age Determined for Squarespot Rockfish Samples

Fishery Biologist John S. MacGregor reports this month that samples of the squarespot rockfish, Sebastes hopkinsi, were aged as part of a continuing

study of rockfish larvae. A small fish, the squarespot rockfish does not exceed 12 inches in total length. As in other species of rockfish, its otoliths do not exhibit isometric growth: A 100% increase in standard length, from 120 mm to 240 mm, results in only a 69% increase in otolith length. This would cause back-calculated lengths from otoliths to be over-estimated.

Squarespot rockfish aged from scales indicate that fish from the more heavily-fished waters near La Jolla, Santa Catalina Island, and San Clemente, grow more rapidly than those from more remote areas such as Cortes Bank and San Nicolas Island.

In addition to the squarespot rockfish analysis, samples of rockfish collected by Biological Technician William Flerx in November 1980 were processed. These were supplementary samples for species not well represented in earlier samples.

Progress in Studies of Egg Production Estimation of Spawning Biomass

After returning from the first leg of the 8104 CalCOFI Jordan cruise, Susan Picquelle, Statistician, continued work on the determination of the optimal subsampling fraction (grams of fish per trawl) to estimate the sex ratio of anchovies. Using data from the 1980 survey, Picquelle calculated new estimates of sex ratio using subsampling fractions ranging from 100 to 400 grams per trawl. By comparing the coefficient of variation (standard deviation divided by the estimate) of sex ratio for the various subsampling fractions, she concluded that the original fraction of 400 grams could be cut in half to 200 grams without seriously reducing the precision of the estimate.

12th Annual US/Soviet Cooperative Ichthyoplankton Survey Completed

Dr. Gary Stauffer, Fishery Biologist, reports that the 12th Annual US/USSR cooperative CalCOFI icthyoplankton survey aboard the Soviet research vessel, Poseydon, ended on April 27 in Long Beach, California. This was the first year since the adoption of the 200-mile offshore zone that the Soviet vessel had a research permit from Mexico. Dimitry Abramenkoff, Biological Technician, and Antonio Diaz de Leon of the Instituto Nacional de Pesca (Ensenada, Mexico), were the U.S. and Mexico observers aboard. Dr. Igor Shuteev of the Soviet Union was the chief scientist. The survey occupied 117 CalCOFI stations and 15 trawl stations between Ensenada, Mexico, and San Francisco, California.

Preliminary results from this survey indicate that hake spawning may be higher than that observed during the last 3 years by Soviet surveys conducted during the February-March period. However, earlier 1981 CalCOFI surveys found relatively few hake larvae, suggesting that hake spawning might have occurred later this year. Results on hake abundance from the 1981 January and February CalCOFI cruises were presented at the US/USSR bilateral scientific meetings held this month in Seattle, Washington, on the status of the fish stocks in U.S. pacific 200-mile zone. Distribution of hake spawning appears to have shifted south to southern California, but the southern limit was still in the

vicinity of the U.S.-Mexico border. The density of anchovy larvae for this April survey was slightly greater than expected compared to previous Soviet February-March surveys, assuming that an April survey should find fewer larvae. Anchovy eggs and larvae were distributed primarily within the southern California Bight and along the Pacific shore of Baja California.

The Poseydon subsequently left southern California to work with the Northwest and Alaska Fisheries Center until mid-July on a survey of fish stocks off Washington, Oregon, and northern California.

Third CalCOFI Survey to Study Anchovy Spawning Biomass Completed

Fishery Biologist Jim Thrailkill reported that all four research vessels conducting CalCOFI surveys successfully completed their cruises in April. The NOAA research vessel, David Starr Jordan, and the Scripps research vessel, New Horizon, completed cruise 8104, the third of the four surveys necessary for making anchovy biomass estimate based on the larva census method. The Jordan also conducted the CalVET egg sampling in CalCOFI regions 11 and 7 for the replicate survey for the egg production method. Only four offshore Bongo stations on lines 63 and 67 off central California were not occupied. Surveying in Mexico's 200-mile economic zone, the New Horizon completed the cruise as planned except for the last CalCOFI line (137) off southern Baja California. The sorting of samples from 8102 cruises were completed this month and CalBOBL (Bongo) samples from the 8104 cruises are currently being sorted.

The California Department of Fish and Game charter cruise aboard the commercial fishing trawler, Nelle Belle, was successful in collecting trawl samples of adult anchovies for the second egg production estimate. Ken Mais, CF&G, and Biological Technician Ron Dotson, SWFC, reported that they made 118 trawl stations, 39 in Mexican waters, and 79 off southern California. Anchovies were taken in 84 of the catches. Because the two trawl surveys conducted by CF&G aboard the Nelle Belle were so successful, more adult anchovies were collected than expected.

Fishery Biologists Dr. Gary Stauffer and Dr. John Hunter reviewed the amount of work required to complete the laboratory processing of female anchovies by September 1981. A PERT chart of the scheme identified the constraints and critical path. The processing schedules were modified to eliminate the bottlenecks without measureable increase in the variance of the parameter estimates.

CAlCOFI Data Files Being Transferred from INFONET to VAX Computer System

Computer Specialist Rich Charter reports that progress is being made in converting the CalCOFI data edit and analysis routines from the INFONET system to the VAX.

The conversion of CALTOW, a program that merges a number of data files and calculates important Bongo net tow values such as volume water filtered and standard haul factors, was successfully completed in late April. The successful conversion of this fundamental program was critical to the completion of the spawning biomass by the July deadline. The SIZED LARVA EDIT program was converted earlier. The SORTER TALLY EDIT and PLANKTON VOLUME EDIT programs are scheduled to be converted next.

Aerial Marine Resource Monitoring System Data Used

Computer Specialist Susan Iacometti reports that the Aerial Marine Resource Monitoring System (AMRMS) survey data values for Dr. George Hunt, University of California at Irvine, was completed this month. These summaries of anchovy sightings are being compared to data on bird population densities for the same time period and region. The full-scale development and implementation for the AMRMS data base and its updating and verification programs is underway on the Burroughs computer. A project is also being planned with Mike Phillips, Economist, to develop programs to analyze the aerial survey data for a measure of fish availability (e.g., to the San Pedro fleet on a weekly basis, for example), and for transferring copies of the data base to the VAX.

This month documentation concerning data descriptions and availability for four of five data bases maintained by the Commercial and Recreational Fisheries Research for Management Group was submitted to the ADP department. This information will contribute to a national inventory being compiled of data bases within federal government offices.

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Gail Theilacker, Fishery Biologist, and Patricia Hadley, Biological Laboratory Technician, were recipients of programming assistance. Summary statistics were produced to determine mean and standard error for the weight and length of fish larvae on different diets.

Oceanic Fisheries Resources Division

MARINE MAMMAL BIOLOGY AND TECHNOLOGY PROGRAM

International Meeting on Marine Mammal/ Fisheries Interactions Held at La Jolla

The International Union for the Conservation of Nature and Natural Resources (IUCN) held a workshop meeting on marine-mammal/fisheries

interaction at the La Jolla Laboratory, March 30 to April 1. Dr. Douglas DeMaster, Wildlife Biologist, John Henderson, Fishery Biologist, and James Coe, Supervisory Fishery Biologist, co-authored a paper for the workshop. The paper, "Conflicts between marine mammals and fisheries off the coast of California," summarized information from two sources: A report from the first year of a contract to document marine mammal fisheries interactions in California (contract to the California Department of Fish and Game) and one from the Cooperative Marine Mammal Salvage Program of the SWFC. The authors concluded that most of the damage to catch and gear is caused by sea lions (Zalophus californianus) and harbor seals (Phoca vitulina) in the commercial salmon trolling fishery, the salmon gill and trammel net fisheries, and the southern squid fishery. Information from the Salvage Program indicated that both gray whales (Eschrichtius robustus) and short-finned pilot whales (Globicephala macrorhynchus) are being affected by fisheries.

The meeting was attended by 28 participants representing 24 organizations or universities within 8 different countries. Other attendees from the Southwest Fisheries Center included Dr. William F. Perrin, Leader of the Marine Mammal Biology and Technology program, and Dr. Albert C. Myrick, Jr., Leader of the Marine Mammal Age Determination Determination Project. Important visitors to the meeting at the Center included Dr. Sidney J. Holt and Dr. Ray J. H. Beverton, co-authors of "On the dynamics of exploited fish populations," a landmark work in the field of fishery population dynamics. Holt is currently studying fish and marine mammal populations at the University of California, Santa Cruz; Beverton has returned to fishery population dynamics research after having served as the Director of the National Environmental Research Council, United Kingdom.

Workshop participants confer during the International Meeting on Marine Mammal/Fisheries Interactions at the La Jolla Laboratory (left to right: Bruce Mate, James A. Estes, Sidney J. Holt, Ray J. H. Beverton, and Stephanie Kaza).

Pinniped Research Proposed at the Channel Islands

An agreement among the Marine Sanctuaries Program (MSP), the National Park Service (NPS), the Southwest Region, and the Southwest Fisheries Center is being negotiated concerning research on pinnipeds found within the marine sanctuary of the Channel Islands National Park. The research will be oriented to fulfill the information needs of the NPS concerning the status of pinnipeds in the park. The proposed research will also complement existing research plans of the SWFC's Coastal Marine Mammal Project. The research proposal will concentrate on testing the ability to monitor populations of pinnipeds from aerial photographs. "Ground truthing" and the conduct of aerial photographic flights will be supervised by the SWFC.

Study to Age Dolphins Using Amino Acid Racemization Completed

Wildlife Biologist Dr. Albert Myrick, Jr., Leader of the Marine Mammal Age Determination project, reports the receipt of the final report describing the use of amino acid racemization to determine the age of dolphins. The report is a result of studies by Dr. Jeffrey L. Bada and Steven E. Brown of the Scripps Institution of Oceanography carried out under contract with NMFS. The technique calculates age, using an estimate of molecular transformation (from "D" type to "L" type) in the aspartic acid extracted from dolphin teeth and eye lenses to determine the final D/L ratio.

Ten specimens representing Stenella attenuata and Stenella longirostris were analyzed. The ages deduced from the amino-acid technique were found to be in fairly close agreement with tooth-layer counts in only 4 cases. The report, which proposes continued research with the aim of resolving the disagreement between amino-acid and tooth-layer-count ageing methods, will be issued shortly as a SWFC Administrative Report.

Analysis of "Sundown Sets" Nears Completion

Early this month Charles Oliver, Computer Specialist, completed the task of assembling data from NMFS, the Inter-American Tropical Tuna Commission, and the Living Marine Resources, Inc., on the U.S. tuna-fleet performance in sundown sets on porpoise schools. This composite data base is being analyzed by James Coe, Fishery Biologist, in order to clarify 1) the causes of high porpoise kills in these sets, and 2) the effects of the NMFS regulation prohibiting sets within 90 minutes of sundown. This regulation is presently included in government regulations governing the conduct of U.S. tuna fishing in 1981 through 1985 but is in abeyance pending completion of these analyses.

Coe reports that the computer programs to perform the analysis have been written, tested, and are being used on data for 1977, 1978, 1979, and 1980. Biological Technicians Tod Foster and Mark Lowry are assisting in tabulating the results. An extensive review of the results is planned which will determine the extent to which further analyses will be necessary. A draft report of the results is expected by the end of May.

Marine-Mammal Satellite Transmitter Tested On Simulated Dolphins

Fishery Biologist Jacqueline Jennings reports that satellite-linked transmitters designed for dolphin tracking were tested from March 19-30 at the Scripps Hydraulics Lab, Scripps Institution of Oceanography. Participating in the tests were Jennings and Biological Technician Ray Stives, SWFC, and Electrical Engineer Larry Stogner, Fishery Engineering Lab, Southeast Fisheries Center, with the assistance of several members of the SWFC staff.

Analysis of film and radio transmissions of a spotted dolphin outfitted with a radiotelemetry pack in May 1980 indicated that the entire antenna was usually not exposed long enough to transmit a full signal: the NIMBUS-6 satellite requires a message of 980 msec. Of a sample of 128 signals, only 39.1% were of sufficiently long duration to insure a successful "up-link" (i.e., a correctly received message from transmitter to satellite). These findings led to several modifications of the transmitter. The most important changes involved placing the antenna on a 19-cm pedestal and increasing the power from 0.5 watt to 1.0 watt.

SWFC personnel designed a dolphin simulator in order to check out the modified transmitters before conducting another field experiment. A fiberglass mold was made of a spotted dolphin (without pectorals and flukes, which would cause considerable drag.

The dolphin was rotated around an axle through a 1.25-m diameter circle. The surfacing time was regulated by a rheostat. The simulator was suspended in a tow tank from a mobile platform. The 90-foot long tow tank was filled with salt water, and a wave generator was used to simulate an ocean environment.

Unfortunately, the recorder on the NIMBUS-6 satellite had ceased to operate, limiting the use of the satellite to those times when the transmitters and the tracking station were both within sight of the satellite. The tracking was done by Goddard Space Flight Center in Maryland. The 3,000-mile separation made conditions marginal.

During Phase 1 the physical parameters affecting reception by the satellite were defined. The simulator was rotated in place without any wave action. It became apparent that the hills east of the lab limited reception during those passes when the elevation angle was greater than 20°. Optimal elevation angles for Goddard Space Flight Center were greater than 10°. Elevation angles at either end of greater than 80° also reduced the likelihood of reception. The results were encouraging, with sufficient up-links (greater than four) received for position determinations on 8 of 12 operational passes.

During Phase II the simulator was rotated while traversing the tank, and waves were produced. No location determinations were obtained from the test transmitter during 10 passes. However, only 5 of the passes had good operational conditions.

The final phase was designed to evaluate the effect of forward motion (traversing the tank) during a pass with good elevation angles. For the first half of the pass, the simulator rotated while traversing the tank and during the second half, it rotated in place. Two transmissions were received from the test transmitter while traversing the tank and 11 while stationary. The test was terminated on March 30, 1981.

In view of these results, the test transmitter was examined and found to have a faulty bit-rate oscillator, in addition, the metal around the transmitter and the second electric motor to traverse the tank may have affected the transmissions. The transmitter is being modified so that the transmission repetition rate (delay between possible transmissions) is reduced from 14 sec to 7 sec to maximize opportunities to transmit, in order to get at least four up-links to the satellite.

The transmitters will go through a factory acceptance test before being returned to the SWFC for additional testing prior to a field experiment in Hawaii. The satellite tracking facility in Hawaii will be used for the experiment, which will optimize many of the limiting physical parameters.

Age Structure of Spotted Dolphin Schools Analyzed

Dr. Warren Stuntz, Fishery Biologist, has begun an analysis of age structure of spotted dolphin schools, in which data from the Dedicated Vessel trips are compared with data (life history, set-log, and tally-sheet data) from observer vessel trips. The analysis involves comparisons of the proportions of each spotted dolphin color pattern class and the length frequencies of dolphins in schools among the data sets. The results will be presented as an Administrative Report.

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During the past month Fishery Biologist Warren Stuntz and Fishery Technician Thomas Shay drafted and edited several manuscripts. These include "Radio-tracking as a method for obtaining metabolic rates for cetaceans," "Dolphin serum blood chemistry," and "The tuna-porpoise bond: A review." Cooperating with Stuntz and Shay on these manuscripts have been Dr. Bernd Wursig and Randall Wells, UC Santa Cruz, Fishery Biologists David Au, James Coe, and Albert Myrick, Jr., and NOAA Corps Officer Wayne Perryman.

MARINE MAMMAL MONITORING AND ASSESSMENT PROGRAM

Photographs from Aerial Study of Porpoise Schools Analyzed

LCDR Wayne Perryman, NOAA Corps, has finished a preliminary screening of the photographs taken in last November's aerial photography study which was conducted jointly with the Inter-American Tropical Tuna Commission (IATTC).

The study investigated the feasibility of using aerial photography to validate the accuracy of observer estimates of porpoise school sizes and to examine the size composition of the porpoise schools. The initial examination of the photographs is very encouraging: A large number of the photographs appear suitable for school size estimate comparisons and a large subset of these may be suitable for use in the school composition study. Perryman, Biological Technician Ray Stives, SWFC, and Mike Scott of IATTC used image enlargement and enhancement equipment at the NASA facilities in Bay St. Louis, Mississippi, to enumerate individual animals in each photograph. Data from this experiment will be extremely useful in the estimation of absolute abundance and vital rate parameters of porpoise stocks in the eastern tropical Pacific.

1981 Marine Mammal Aerial Survey Completed

The scientific party taking part in an aerial survey designed to test the accuracy of estimating density of porpoise schools returned from Liberia, Costa Rica, on April 7, 1981. Participating SWFC personnel included Dr. Rennie Holt, Operations Research Analyst and Survey Leader, Biological Lab Technician Larry Hansen, Computer Specialist Frank Ralston, and Biological Technicians William Brinkerhoff and Mark Lowry. William Walker of the Los Angeles County Museum was also a member of the survey party.

The research project tested the effect of weather and sun glare on the ability of observers in an airplane to detect porpoise schools directly beneath the plane (see February 1981 Center Monthly Report). Variable sea state conditions were experienced which allowed porpoise schools to be sighted in combination with the different sun glare conditions. Survey members were able to achieve their goal of obtaining a minimum of 60 sightings in each category of the sea state-sun glare matrix. Although they experienced several delays due to weather and mechanical problems, they found the rate of sighting porpoise schools to be considerably higher than anticipated. A total of 373 marine mammal sightings were made during 121 flight hours.

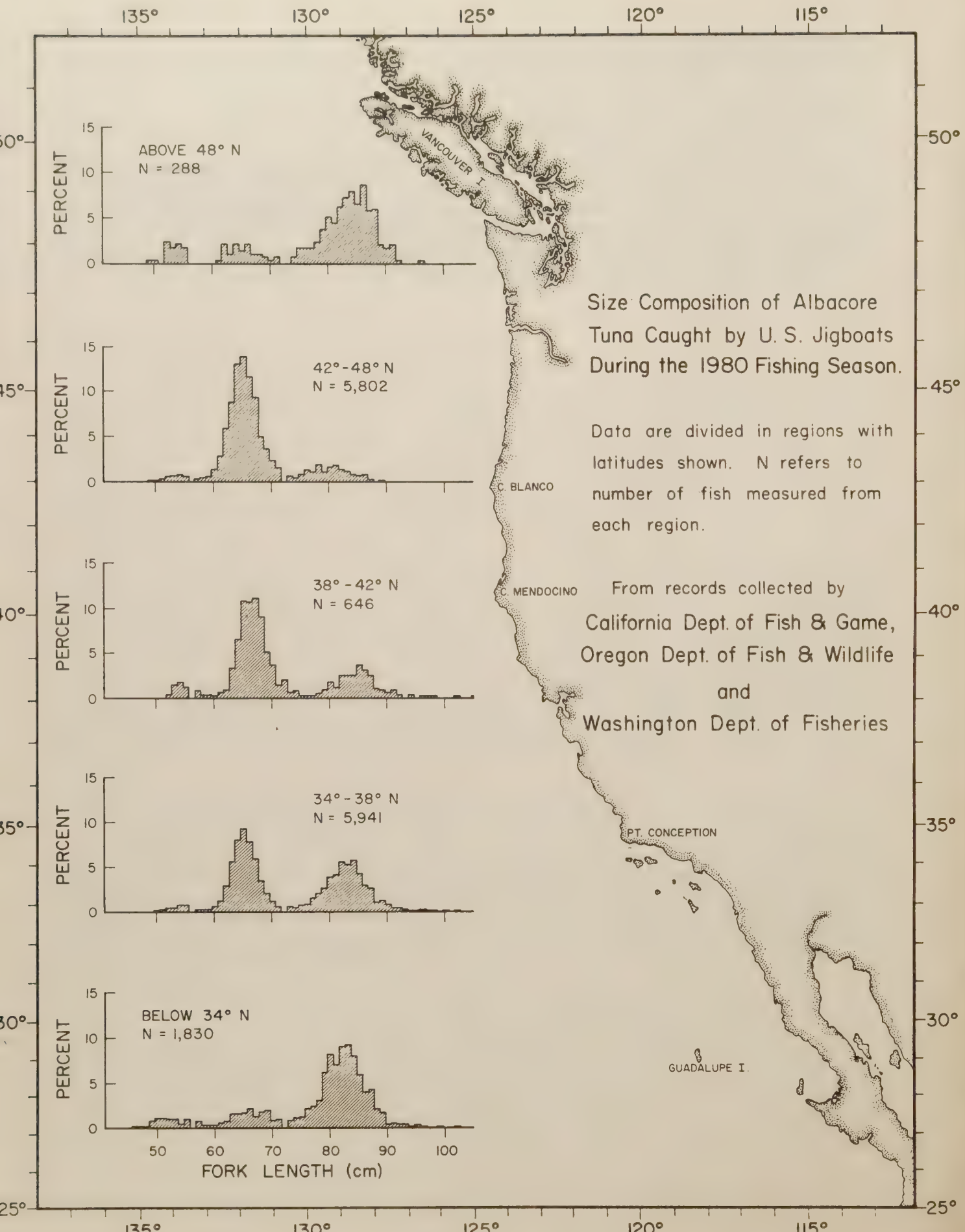
Dr. R. Holt Participates in IATTC Meeting in Nicaragua

Dr. Rennie Holt, Operations Reseach Analyst, participated in a porpoise-tuna problem research planning meeting sponsored by the Inter-American Tropical Tuna Commission (IATTC) in Managua, Nicaragua, April 6 to 10, 1981. Discussion focused on possbile research directions for improving understanding of the interaction between the porpoise and tuna populations, and of the status of the porpoise populations.

TUNA/BILLFISH RESOURCES PROGRAM

1980 United States Albacore Fishery Data Readied

Fishery Biologist Tony Majors reports that he has summarized data on the performance of the 1980 U.S. albacore fishery. The field data, which include sample catch and effort data from logbooks and sample length frequency data from port sampling, are collected by the Pacific Marine Fisheries Commission and forwarded to the Southwest Fisheries Center. The sample size compositon of albacore taken by U.S. jigboats is shown in the accompanying figure.



Size Composition of Albacore Tuna Caught by U. S. Jigboats During the 1980 Fishing Season.

Data are divided in regions with latitudes shown. N refers to number of fish measured from each region.

From records collected by California Dept. of Fish & Game, Oregon Dept. of Fish & Wildlife and Washington Dept. of Fisheries

TIBURON LABORATORY

FISH COMMUNITIES INVESTIGATION

Western Groundfish Conference Proposed

At the request of Dr. I. Barrett, Director of the Southwest Fisheries Center, and Dr. W. Aron, Director of the Northwest and Alaska Fisheries Center, Dr. William H. Lenarz, Leader of the Rockfish Analysis Task, and Dr. Robert Francis of the Northwest and Alaska Fisheries Center's Seattle Laboratory, are organizing a meeting of researchers involved with groundfish of the West Coast. During a recent meeting with the Center Directors, it became apparent that while there is much ongoing research on West Coast groundfish, and several management-oriented meetings have addressed the topic, there is no forum through which academic and management researchers can communicate. While management-oriented meetings, such as the Groundfish Management Plan Development Teams of the Pacific Fishery Management Council and the North Pacific Fishery Management Council, permit some communication among groundfish workers, academic research is poorly represented. Furthermore, the management demands of such meetings hinder the flow of ideas which characterize less structured scientific meetings.

Lenarz and Francis envision a Groundfish Conference patterned after the highly successful annual CalCOFI and Tuna Conferences. In a memo to many potential participants, they proposed the meeting be held in November or December 1981 on the north coast of Oregon. They also proposed the formation of a coordinating body, composed of representatives of management agencies and academic institutions, as a mechanism to organize future meetings.

Early response to the proposed meeting has been highly favorable. If there is enough interest among researchers to justify holding the meeting, Lenarz and Francis will make a final selection of the meeting site and date, and begin soliciting scientific speakers for the conference.

Research Cruise Investigates Behavior of Widow Rockfish

In response to the urgent need for biological information on the widow rockfish, Sebastes entomelas, Fishery Biologist Peter Adams of the Predator-Prey Task participated in a research cruise this month aboard the research vessel, Chapman, of the Northwest and Alaska Fisheries Center. The widow rockfish has experienced a spectacular rise in importance to the commercial fishery. There were virtually no landings prior to 1978, but since then the catch has increased to a 1980 level of 16,000 metric tons, or 61 percent of all rockfish landings. Management of the fishery requires knowledge of this species' biology, especially its trophic relationships. Adams is particularly interested in establishing a feeding chronology for this species, which is suspected of having unusual day-night behavior. The widow rockfish apparently schools at night, and disperses while feeding during the day--the reverse of the more usual condition.

Although samples were taken, and hydroacoustic data were collected that document the dispersion of the nighttime aggregations at dawn, overall cruise results were disappointing. Problems relating to the seasonal availability of this species and to the highly sophisticated techniques needed to fish midwater targets, frustrated attempts to make consistent catches.

FISHERIES DEVELOPMENT INVESTIGATION

Potential Markets for Shortbelly Rockfish Explored

Sus Kato, Leader of the Fisheries Development Task, reports that about 75 tons of shortbelly rockfish (Sebastes jordani) were caught last month by the commercial trawler, Colintino Rose II, chartered by the National Marine Fisheries Service's Tiburon Laboratory. The fish were frozen and packed whole by local processors and shipped to various potential markets.

Twenty tons of the shortbelly rockfish were also shipped to Japan by the San Francisco Trading Company, Oakland, California. The importing firm will attempt trial sales of the shortbellies in several different ways, including semi-dried. An earlier shipment of fresh shortbelly rockfish was sent by airfreight to the same firm for evaluation as a raw product for surimi (processed fish paste). As in tests at Tiburon Laboratory, the flesh was found to be lacking in elasticity and cohesiveness, but scored high in flavor.

Representatives of one export firm here carried samples of shortblly rockfish on a trip to Japan. In discussions with several potential buyers, the consensus appeared to be that the fish were acceptable, if the appearance (color) could be maintained. Other reservations were related to price. Taste tests were conducted in a restaurant there.

One sample of 50 pounds of frozen shortbelly rockfish was sent to Baader Corporation in Massachusetts for trial heading and gutting in order to obtain information on cost and output of machine-processed fish. Other samples sent to various wholesalers and brokers by a local packer brought similar replies from most--that the fish was quite acceptable in terms of appearance and flavor--but the small size (around 10 inches) makes it difficult to market.

The bulk of shortbelly rockfish caught and packed last month (about 40 tons) are still stored in a freezer in Monterey, California; most of the fish will reportedly be shipped to African markets.

Mesh Liner of Euphausiid Trawl Damaged

During the charter cruise of the Colintino Rose II, the 1/16-inch mesh liner for the euphausiid trawl was torn. New matching mesh has been ordered for use in the reconstruction of the damaged portion of the net. Arrangements are underway to use the net for exploratory fishing in early May 1981 if the repairs can be completed in time.

Cost Analysis of Sail-Assisted Fishing Vessel to be Examined

A contract was awarded to the fishing vessel Tiare for a charter to the Tiburon Laboratory in order to obtain vessel profile data on the cost-effectiveness of a sail-assisted fishing vessel with an auxiliary diesel engine. Data collected during a period of 10 days will be compared with conventional fishing vessels which conduct similar fishing operations.

Sablefish Contract Extended

The consulting firm of Cooperrider-Ryan has requested and been granted an extension of the Sablefish Recovery Contract. The purpose of the contract is to determine the recovery rate of different sizes of sablefish and to identify the various markets where this species can be utilized. The contract is progressing, but was delayed at the beginning due to the nonavailability of sablefish.

PHYSIOLOGICAL ECOLOGY INVESTIGATION

Public Meeting Held on Recent Decline of Young Striped Bass in the San Francisco Bay-Delta Estuary

Dr. Jeannette A. Whipple, Chief of the Physiological Ecology Investigation, spent much of this month preparing for a presentation of striped bass research on April 27 at a Public Meeting convened in Oakland, California, by the California State Water Resources Control Board. The purpose of the meeting was to provide information on the current status of the striped bass population to the Board and the public. Formal presentations were made by representatives of the California State Water Resources Control Board, the California Department of Fish and Game, and the National Marine Fisheries Service.

There has been considerable interest and concern over the continued decline of the striped bass population. This decline has been particularly noticeable in the last three years, and the adult population is now estimated to be approximately 25 to 30 percent of its peak 1960 size. Prior to 1977, fluctuations in the population were attributable to and predicted by changes in river outlfows and diversion volumes. After the severe drought years, however, these relationships have not held, suggesting other factors are now more effective.

Although no conclusions were made at the Public Hearing, pertinent information was presented. Declines in the striped bass population have occurred in all life stages. Reduced numbers in the past four-year-old-year-classes and reduced individual fecundity have caused overall population fecundity to decline. Changes in the nursery habitat are taking place which may affect young-of-the-year survival. There is overall reduced productivity as well as changes in the faunal composition of zooplankters used by larval striped bass. A wide variety of pollutants are being found in the tissues of

adult bass, and preliminary analyses seems to indicate positive correlations between poor physiological conditions and total body burdens.

One of the major outcomes of the meeting was the degree of concern by managers, scientists, fishermen, and the public at large. As more data are collected and analyzed, it is becoming apparent that answers to the striped bass problem are complex. The causative factors which are predominant in determining survival and growth are different between life stages; the next few years of research should clearly define these factors.

Physiological Ecology Laboratory Experiments Being Planned

For the next 5 months, the staff of the Physiological Ecology Investigation will be occupied conducting and preparing laboratory experiments. Experiments will cover all life stages and address problems which seem to be indicated as potential and possible causes for reduced striped bass production. These experiments are outlined in the accompanying table.

Life stage	Type of experiment
Embryo and larvae juveniles	Combined effects of benzene and zinc. Acute bioassays with cyclohexane and alkylated cyclohexanes.
	Benzene and cestode interactive effects.
Adults	Benzene effects on pre-spawning adults.

SOUTHWEST REGIONAL DATA MANAGEMENT AND ADP OPERATIONS

Planning Meetings Held to Upgrade Part of FIN System

Fred Kellenberger, Data Systems Manager, reports that several planning meetings were held in April with personnel from the Southwest Fisheries Center, Southwest Region, and the California Department of Fish and Game, for the purpose of upgrading the CF&G marine statistical fishery system, a part of the Fishery Information Network (FIN). It was agreed during these meetings that a credit card prototype system will be developed in California to reduce errors on fish receipts. The "credit card" system would issue to each fisherman a card with the appropriate name and number. In addition, each dealer will have an imprinter to print this information, along with the dealer information and boat numbers, on the receipt. A recently completed study of the Marine Fisheries Statistics System by Science Applications, Inc., concluded that the error rate on fish receipt would be reduced 40% with this system. This reduced error rate would shorten the editing cycle and insure that accurate information would be available in a timely manner to the State, the National Marine Fisheries Service, and the Pacific Fisheries Management Council. Fast, accurate information is especially crucial for salmon and some species of groundfish where quotas are used as the major management tool.

Installation of Multiplexer Recommended for La Jolla Laboratory

In consultation with Jerry Fitzsimmons, Chief Consultant at UCSD's Computer Center, the staff of the ADP Operation has recommended the installation of a multiplexer in the La Jolla Laboratory to ease the interactive access problems to UCSD's computers. A multiplexer (MUX) is a bank of 8 lines which directly connects 8 terminals via phone jacks to the data switch at UCSD for queuing into the Burroughs, VAX, and CATT computer system, thus by-passing the SWFC telephone switchboard. Of the 8 lines, 3 will be distributed among the project users in the Ocean Fisheries Resources Division, 3 to the Coastal Fisheries Resources Division, and 2 to the computer users' workroom. One of the lines in the computer users area will be dedicated to a line printer. This printer, which is restricted to output of short reports and program testing, will by-pass the data switch at UCSD and connect directly to VAX. The need for the printer is based on the fact that UCSD has no plans to upgrade the current printer output transmission from VAX via Burroughs to the remote job entry stations.

Transfer of Data from INFONET to Burroughs/VAX Computer Systems Nearly Complete

Dorothy Roll, Systems Analyst, reports that in compliance with the April 30 deadline, all data and program files have been transferred from the INFONET system to magnetic tapes which are being validated on UCSD's Burroughs/VAX systems. Remaining on the INFONET system through September 1981 are the disk and tape files necessary for the running of the Financial Reporting System

(FRS) and the critical porpoise reports. All other disk files have been purged. As a security measure, duplicate tapes of the transferred files will be retained at INFONET site. These tapes will be purged after the source tapes are validated and backup copies have been made on the Burroughs/VAX systems.

NMFS Data File Catalog Being Prepared

Fred Kellenberger, Data Systems Manager, reports that at the request of National Marine Fisheries Service Headquarters in Washington, D.C., the Southwest, Southeast, and Northeast Fisheries Centers are preparing a catalog of data file names and description, following the format of the data file inventory used by the Northwest and Alaska Fisheries Center. To facilitate the process, a collection form was designed and distributed, with instructions for filling out the form, to the data managers/coordinators in the laboratories and divisions of the SWFC. The file inventory will be implemented on ADP Network's 1022 Data Management System for ready access by users in SWFC, the other Centers, and headquarters. The files will be cross-referenced by 5 indices: File ID number, laboratory/division, resource, subject, and data collection area. May 31 is the target date for entries of all file descriptions into the inventory system.

Technical Users Meetings Held

ADP operations hosted 5 computer technical users meetings at the La Jolla Laboratory during April. One session was conducted by Jerry Fitzsimmons and Jim Rapp of UCSD's Computer Center, who gave an on-line presentation of the VAX editor, EDT. The interactive session was projected on a screen. During the other sessions, Robert Butler, Computer Specialist, discussed character manipulation routines on the VAX and the standardizing of short names in the VAX LOGIN Command Files.

* * * * * * * * * *

This month Kellenberger completed the final re-draft of the SWFC's FY 1982/1983 Initiative Descriptions. These initiatives contain the ADP requirements for the SWFC and are the basis for the Center's future hardware and software procurement actions.

MISCELLANEOUS

Design Selected for SWFC Solar Demonstration Project

Ben Remington, Executive Officer, reports that McCaughey & Smith Energy Association, Inc., of Tustin, California, has been chosen as the architect/engineer for the Solar Demonstration Project at the La Jolla Laboratory. The selection of this firm was recommended by the Solar Demonstration Project Source Evaluation Board at the Southwest Fisheries Center following a review of the concept design proposals. The project will involve the design and installation of a solar heating system to heat sea water for the aquaria at the La Jolla Laboratory.

Present plans call for a cost proposal to be presented and discussed in La Jolla on May 6, 1981, with a final design review on June 25, 1981. The target date for completion is December 1981. Funds for the design and installation of this system have been made available through a federal Department of Energy grant.

HONORS AND AWARDS

Richard Charter, Computer Specialist at the La Jolla Laboratory, received a Sustained Superior Performance Award.

PUBLIC AFFAIRS

Honolulu Laboratory

On April 1, Richard Uchida, Supervisory Fishery Biologist, served as a Senior Research Panel Judge and Special Awards Panel Judge at the 24th Annual Hawaiian Science and Engineering Fair held at the Neal Blaisdel Center, Honolulu.

Laboratory Director Richard S. Shomura presented a speech at the opening ceremonies of the Sixth Annual Albert L. Tester Memorial Symposium on Zoology at the UH at Manoa campus on April 2. Dr. Stephen Jay Gould, Professor of Geology, Museum of Comparative Zoology, Harvard University, was a guest speaker on the second day of the symposium. Shomura also was one of four panelists on an hour-long question-and-answer program, "Wildlife Conservation," on Honolulu's educational television station (Channel 11) on April 16. The other panelists were Skip Naftel of the Easy Rider, Dr. Sheila Conant of the UH, and Dr. Robert Shallenberger of the U.S. Fish and Wildlife Service.

La Jolla Laboratory

Science and Engineering Fair Students Tour Center

On April 22, twelve junior high and high school students participants in the Greater San Diego Science and Engineering Fair visited the Center's La Jolla Laboratory for a tour and demonstration of the research activities. The students were accompanied by LuAnn Wright, Biology Instructor at Crawford High School in San Diego. Acting as host, Ron Lynn, Oceanographer, presented an introductory film strip and answered questions. Lynn, assisted by Shari Sitko, Editor, escorted the students to lectures and demonstrations in the larval lab and the marine mammal lab. Betsy Stevens, Fishery Biologist, talked about the larval collections and studies and showed specimens. John Henderson, Fishery Biologist, talked on the biology of porpoises and showed skeletal specimens and the new environmental chamber for the dermested beetles used in preparation of porpoise skeletons. Dr. Al Myrick, Wildlife Biologist, lectured on the porpoise aging project and presented a demonstration of the step-by-step preparation of porpoise teeth and the identification and counting of growth layer groups. John Carr, Deputy Director, SWFC, served as one of the judges at the Fair.

Participants in the Greater San Diego Science and Engineering Fair pose on the Center grounds after a tour of the facilities. At extreme right are Shari Sitko and Ron Lynn who hosted the tour.

42 Staff Members of La Jolla Laboratory Donate Blood

On April 28, 42 staff members at the SWFC's La Jolla Laboratory rolled up their sleeves and donated a pint of blood to the San Diego Blood Bank. In return for their generosity, the National Marine Fisheries Service's Blood Reserve Fund will receive 36 credits for use by its employees and their families.

Biological Technician Ron Dotson (left) and Computer Programmer Bob Nydam (right) pose in front of the Bloodmobile after donating blood.

Tiburon Laboratory

This month Laboratory scientists gave several talks to the public and visiting students. On April 1, Maxwell Eldridge, Supervisory Fishery Biologist, presented a talk on "Potential factors affecting the decline of striped bass eggs and larvae" to the Sacramento Chapter of American Fisheries Society, in Davis, California. On April 3, Dr. Gordon Chan's Fishery Biology class from the College of Marin, Kentfield, California, visited the Laboratory. Dr. Edmund S. Hobson, Supervisory Fishery Biologist, spoke to them about "California coastal fish communities," and Maxwell Eldridge discussed ongoing research at the lab.

PRESS RELEASES

Honolulu Laboratory

April 30 - "Research vessel completes fishery survey."

SEMINARS

Honolulu Laboratory

April 30 - Dr. Lucius Eldredge, University of Guam Marine Laboratory, presented a seminar and slide show on the northern islands of the Mariana Archipelago.

La Jolla Laboratory

April 14 - Dr. Galen Jones, University of New Hampshire, Durham, New Hampshire, spoke on "Heavy metal toxicity of seawater."

April 21 - Dr. Dag Slagstad, Institut for Teknisk Kybernetikk, University of Trondheim, Norway, presented a talk on "Modeling and simulation of physiology and population dynamics of copepods."

Tiburon Laboratory

April 2 - Philip M. Roedel presented a talk on "International Center for Living Aquatic Resources Management (ICLARM) - A new approach to international fisheries research" at a joint San Francisco State University/ Tiburon Laboratory seminar held at the Tiburon Laboratory.

April 21 - Dr. James E. Cloern, U.S. Geological Survey, Menlo Park, California, talked about "What regulates phytoplankton dynamics in south San Francisco Bay?" at a joint San Francisco State University/Tiburon Laboratory seminar held at the Tiburon Center for Environmental Studies.

TRAINING

La Jolla Laboratory

April 1 - Lorraine Zorich, Administrative Assistant,- "Women in Management," OPM, San Diego, CA.

Tiburon Laboratory

April 13-17 - William S. Leet, Fishery Biologist - "Fisheries Technology," Clatsop Community College, Astoria, OR.

VISITORS

Honolulu Laboratory

April 1 - Y. Harada, International Affairs Division, Federation of Japan Tuna Fisheries Co-operative Associations.

April 6-8 - Adli Kallini Abiskharoon, General Director; Mohamed Yousef Taher, General Manager, Aquaculture Department; and Riad Nabil Bassily, Controller Manager, Aquaculture Projects, all with the Ministry of Agriculture, Undersecretariat for Aquatic Resources, Egypt.

April 9 - Takuji Hamaguchi, Office Manger, Hamaguchi Fishing Pole Manufacturing Company, Ltd., Yaizu, Japan.

April 10 - Dr. Yoh Watanabe and Isamu hirano, Japan Marine Fishery Resource Research Center, Tokyo, Japan.

April 19 - Mr. and Mrs. Jack W. Gehringer, Washington, D.C. (Mr. Gehringer was Deputy Assistant Adminstrator for Fisheries, Washington, D.C. until his recent retirement).

April 23 - Carmen Blondin, F/IA, Washington, D.C.

April 24 - Dr. Clinton E. Atkinson, Seattle, WA.

La Jolla Laboratory

March 28-April 27 - Dr. Jürgen Alheit, Programa Cooperativo Peruano-Aleman de Investigacion Pesquera, Callao, Peru, visited the Survey Systems Development and Evaluation group in the Coastal Fisheries Resources Division.

March 30-April 24 - Dra. Haydee Santander, Instituto del Mar del Peru, Callao, Peru, visited the Survey Systems Development and Evaluation group of the Coastal Fisheries Resources Division.

April 6 - Dr. Garth Murphy, CSIRO, Cronulla, Australia, visited the Coastal Fisheries Resources Division.

April 9 - Dr. Dorothy F. Soule, EPA-SAB, University of Southern California, Los Angeles, CA.

April 20-24 - Dr. Dag Slagstad, University of Trondheim, Norway, visited the La Jolla Laboratory and met with Dr. Reuben Lasker, Chief of the Coastal Fisheries Resources Division.

Tiburon Laboratory

April 3 - Dr. Gordon Chan and Don Ferdinand, College of Marin, Kentfield, CA.

April 17 - Robert S. Hoffman and James J. Slawson, Southwest Regional Office, Terminal Island, CA.

April 21 - Bill Skang and Bill Wititaker, KQED-TV, San Francisco, CA.

April 23 - Andrea Katz, California Academy of Sciences, San Francisco, CA.

April 27 - Ronald D. Hess and Paul McGregor, California Department of Fish and Game, San Rafael, CA.

April 28 - Terry Elwell, National Marine Fisheries Service, Juneau, AK.

MEETINGS AND TRAVEL

Honolulu Laboratory

April 1 - Director Richard Shomura attended the 29th WPRFMC meeting at the Hawaii State Capitol.

April 10 - Richard Shomura participated in a meeting of the Coordinating Council on Research in the NWHI.

April 10 - Richard Shomura attended a meeting of the ad hoc subcommittee of the Scientific and Statistical Committee, WPRFMC, at the HDFG to review National Marine Fisheries Service Section 7 Biological Opinion for the spiny lobster fishery management plan.

La Jolla Laboratory

March 29-April 1 - Dave Mackett traveled to Alexandria, VA to attend an East Coast Planner's Meeting.

March 31-April 1 - Dr. R. M. Laurs traveled to Pasadena, CA to attend a meeting concerning plans to develop a new initiative to replace the cancelled NOSS program.

April 2 - Dr. Izadore Barrett, Center Director, and John Carr, Deputy Director, participated in a U.S. Tuna Advisory Committee meeting at the La Jolla Laboratory.

April 6-8 - Dave Mackett attended the West Coast Planner's meeting in Seattle, WA.

April 7 - Dr. Izadore Barrett traveled to Terminal Island, CA for a meeting on the S-K process.

April 9 - Fred Kellenberger traveled to Terminal Island to attend a FIN meeting with Southwest Region and California Fish and Game personnel.

April 9-13 - Dr. Gary Stauffer attended a US/USSR/Canadian workshop on Hake research, past, present, and future, at the NWAFC, Seattle, WA.

April 13-15 - Dr. William Perrin traveled to Seattle, WA to participate in a review of cetacean research at NWAFC (NMML).

April 14-16 - Fred Kellenberger attended a Coastwide FIN Subcommittee meeting in Portland, OR.

April 16-17 - Dr. Izadore Barrett traveled to Monterey and Tiburon, CA to conduct annual appraisals with the Chief of PEG, and the Director of the Tiburon Laboratory.

- Dr. Robert Owen traveled to Point Hueneme, CA to meet the R/V David Starr Jordan and transport personnel and equipment.

April 20-24 - Dr. R. Michael Laurs traveled to Corvallis, Newport, and Coos Bay, OR to present seminars.

April 22 - Dr. Izadore Barrett participated in a meeting of the University of California Institute of Marine Resources Advisory Council at Scripps Institution of Oceanography.

April 23 - Dr. Izadore Barrett chaired the San Diego/La Jolla Underwater Park Advisory Committee Meeting in San Diego, CA.

April 24-27 - Dr. Doug DeMaster traveled to San Nicholas Island to conduct elephant seal/sea lion ground counts.

April 25-May 9 - Dr. Angeles Alvariño traveled to La Paz, Mexico, to present seminars at CICIMAR.

April 27-28 - Jim Thrailkill met the Soviet R/V Poseydon in Long Beach, CA.

April 28 - Dr. Izadore Barrett, Center Director, attended a California Fish and Game meeting regarding anchovy, in Long Beach, CA.

- John Carr traveled to San Pedro, CA to attend a meeting with recreational fishery leaders.

- Dr. Dan Huppert traveled to Long Beach, CA to attend a California Fish and Game meeting regarding anchovy and to San Pedro to meet with recreational fishery leaders.

Tiburon Laboratory

March 31-April 2 - Dr. William H. Lenarz attended the Groundfish Team Meetings at Seattle, WA.

April 2-3 - Ed Weber travelled to Seattle, WA to attend a meeting of the Pacific fishery Management Council's Working Group on Logbooks.

April 13 - Dr. Jeannette A. Whipple and Dr. Bruce MacFarlane attended a meeting at the California Department of Fish and Game, Stockton, CA.

April 27 - Dr. Jeannette A. Whipple presented a Workshop at a Public Meeting held by the State Water Resources Control Board in Oakland, CA.

PERSONNEL

Honolulu Laboratory

April 10 - Lance S. Asagi, Biological Aid, Appointment Under Stay-in-School Program.

April 30 - Heather C. Wong, Computer/Biological Aid, Young Adult Conservation Corps, One-Year Joint Appointment with USFWS.

La Jolla Laboratory

April 5 - Eric Lynn, Biological Technician - Promotion

April 12 - Susan Covey-Walker, Library Technician - Resignation

April 19 - Barbara Watkins, Purchasing Agent - Promotion

Tiburon Laboratory

April 27 - Steven J. Pace, Biological Aid - Temporary Appointment

Pacific Environmental Group

April 20 - June Favorite, Computer Technician - Promotion

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